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School Environments and Behaviors of Students on the Autism Spectrum

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Pervasive Developmental Disorders, which are sometimes referred to as Autism Spectrum Disorders, are a set of increasingly prevalent disorders. Coffrey and Obringer (2004) pointed out that, under the Individuals with Disabilities Education Act (IDEA), Autism was not a distinct disability category until 1997. "Around 1 in 150 children have an ASD, with males being affected three to four times more frequently than females" (Landa, 2008, 138). Pervasive Developmental Disorders are a grouping of disorders that can negatively affect a child's communication and social skills. In a school setting, these negative effects can diminish a child's ability to complete expected tasks. In order to aid the success of children with Pervasive Developmental Disorders, teachers can implement adaptations and create accommodations for these students. Since the Pervasive Developmental Disorders are extremely variable, the effectiveness of any given intervention will be dependent upon that child's specific case.

This literature review will first discuss Pervasive Developmental Disorders as a broad category, and then will discuss each of the diagnoses included in the Pervasive Developmental Disorders category briefly. The literature review will discuss common behaviors and issues related to Pervasive developmental disorders, as well as the research on the current interventions in schools for students with Autism.

The diagnoses of Pervasive Developmental Disorders are increasingly common. In 2007, the Centers for Disease Control and Prevention released data that about 1 in 150 8-year-old children had an Autism Spectrum Disorder [/Pervasive Developmental

Disorder]" (Centers for Disease Control and Prevention, 2008, para.3). In order to provide the best education for students with Pervasive Developmental Disorders, more research needs to be done concerning the factors affecting these students in the schools, which includes stereotyped behaviors.

Pervasive Developmental Disorders

Pervasive developmental disorders encompass a wide range of problem areas involving, communication, social, and behavioral/motor abnormalities. "The causes of these disorders is unknown although brain structure abnormalities, genetic mutation, and alterations in brain function are believed to all play a role. Still, no single brain abnormality or location has been connected to a cause (Barstow, 2002, p.2569)."

Pervasive Developmental Disorders (PDD) are often referred to as Autism spectrum disorders (ASD). "Autistic disorder (AD) is classified in the Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM-IV), as one of five related PDDs" (American Psychiatric Association, 2000). Along with Autistic disorder (AD), the other four PDDs are "Pervasive Developmental Disorder Not Otherwise Specified (PDD-NOS), Asperger Syndrome, Childhood Disintegrative Disorder and Rett's Disorder (Angley et al., 2007)." The five disorders grouped together as Pervasive Developmental Disorders are all characterized by social impairments, and many include problems with communication and behaviors as well.

Among children with Pervasive Developmental Disorders, impairments vary, but can include impairments with language use, such as "turn-taking in conversation and the ability to take the listener's perspective, poor speech prosody (e.g., typical rising and

falling of voice pitch and inflection that aids verbal communication), a tendency to dwell on certain topics, difficulty understanding and expressing emotions, and difficulty interpreting nonliteral language such as sarcasm and metaphor (White et al., 2007, 1858-1859)." Other potential indicators for Autism and related disorders are listed below in Table 1 (Angley et al., 2007, 743).

Table 1. Red flags for autism and related disorders

- A plateau or regression in development (particularly language or social skills) not typically associated with a regression in physical development
- Speech and language delay (i.e., No single words by 2 years), or stereotypical use of language such as repetition or jargon
- A lack of, or reduced social eye contact
- Failure to orient to name
- Failure to "cuddle in" or lift their arms to be picked up by parent or caregiver
- Failure to point or use gestures such as showing to engage parent (or caregiver) to share an experience or an object of interest
- Lack of interactive and/or functional play – that is child does not use toys as they should be used but focuses on a particular part of the toy
- Lack of interest in peers
- Unusual preoccupations; may be with parts of objects or interests such as trains or water
- Resistance to change
- Unusual body movement such as hand flapping or twisting, rocking, spinning, pacing, toe walking, unusual sensory interests (e.g., over or under reacting to sound and pain, mouthing objects, feeling textures)

As a primary social disorder, Pervasive Developmental Disorders often inhibit children's abilities to interact properly with peers. Part of the problem that children with Pervasive Developmental Disorders have with proper social interaction is their inability to read facial expressions and body language, which are key aspects of social interactions. Begeer et al. (2006) commented that "reading others' emotional expressions is essential to social interactions, because this information helps to explain and anticipate other people's actions (p. 37)." The difficulty that children with Pervasive Developmental

Disorders have with reading others' emotional expressions is detrimental to their learning experience, because classroom learning is becoming more cooperative among the students. Begeer et al. (2006) found that children with autism were less attentive to facial emotion expressions than children without autism, except when asked to make a situational decision. Being unable to read facial emotions and body language cues places students with Pervasive Developmental Disorders at a disadvantage, especially when given tasks requiring group interaction and cooperation. The inability or decreased ability of children with Pervasive Developmental Disorders to read social cues, facial expressions, or body language disconnect these children from their peers and removes them from social situations in which they would be able to learn proper social behavior.

Defining the Five Pervasive Developmental Disorders

Autistic Disorder

Autistic Disorder is a neurodevelopmental disorder, which can frequently co-occur with other developmental delays. "Approximately 75% of those with AD have concurrent intellectual disability (Angley et al., 2007, 741)." Other common characteristics of children diagnosed with Autistic Disorder are overactivity, aggression, and heightened sensitivity to touch, noise and smells. Children with Autistic Disorder can also be characterized by their actions, which "are repetitive, routine, and restricted (Barstow, 2002, p.2568)." Children with Autistic Disorder present on a diverse spectrum of symptoms, with varying degrees of intelligence and connectedness. Some children with Autistic Disorder will not respond to affection and exhibit no interest in other people.

Asperger's Disorder

Asperger's Disorder "is similar to autism, but children with Asperger's do not have the same difficulties in acquiring language that children with autism have (Frey, 2003, p.83)." Asperger's Disorder primarily affects a child's abilities for social interaction. "The distinguishing features of AS are problems with reciprocating and empathizing with the feelings of others; difficulties with nonverbal communication (such as facial expressions); peculiar speech habits that include repeated words or phrases and a flat, emotionless vocal tone; an apparent lack of "common sense"; a fascination with obscure or limited subjects […] often to the exclusion of other interests (Frey, 2003, p. 84)." Similar to Autistic Disorder, children diagnosed with Asperger's Disorder can exhibit "clumsy and awkward physical movements (Frey, 2003, p.84)" and stereotyped, repetitive behaviors. Because of the difficulty in properly diagnosing AS, "misdiagnoses are common; AS has been confused with such other neurological disorders as Tourette's syndrome, or with attention-deficit disorder (ADD), oppositional defiant disorder (ODD), or obsessive-compulsive disorder (OCD) (Frey, 2003, p.85)."

Childhood Disintegrative Disorder (CDD) and Rett's Syndrome

Rett's Syndrome and CDD are both rare disorders. Both present with social and behavioral abnormalities and unlike the other PDDs, involve progressive deterioration over time.

Pervasive Developmental Disorder Not Otherwise Specified (PDD-NOS)

Pervasive Developmental Disorder Not Otherwise Specified (PDD-NOS) is the fifth diagnosis included among the Pervasive Developmental Disorders. PDD-NOS

encompasses all primary social disorders that do not meet the criteria for a diagnosis of one of the other four disorders.

Similarities among Pervasive Developmental Disorders

The Pervasive Developmental Disorders are grouped together because they share common characteristics, such as social abnormalities. However, most children with PDDs are prone to repetitive, restrictive behaviors. Although individual children with Pervasive Developmental Disorders vary greatly, even within the distinct diagnoses, repetitive behaviors have been identified as common to most cases. The behaviors can include, but are not limited to, "rocking, hand and arm flapping, and unusual hand and finger movements" (Barstow, 2002, p.2568).

A significant percentage of children with Pervasive Developmental Disorders also have an associated diagnosis of mental retardation. However, children with PDDs differ from those with mental retardation alone. Carcani-Rathwell et al. (2006) found that "overall subjects with a [Pervasive developmental disorder] diagnosis were more likely to have [repetitive and stereotyped behaviors] than those with only Mental Retardation (576)." These repetitive and stereotyped behaviors are a significant problem for students with Pervasive Developmental Disorders in classroom settings. The repetitive and stereotyped behaviors typically affect a student's ability to concentrate and complete tasks.

The behaviors can be disruptive to the student with the PDD, but also to the other students in the classroom setting. Because of the disruption and distraction caused by these repetitive and stereotyped behaviors, research should be completed to examine

factors that increase the prevalence of these behaviors. Examining environmental factors that impact these behaviors would allow teachers to be aware of triggers for these behaviors and potentially help to plan for decreasing them.

Non-behavioral Interventions

Current research examines cognitive/language interventions, along with diet, physical and metabolic differences of children with pervasive developmental disorders. Landa (2008) commented that "most of the literature on the efficacy of intervention for ASDs in preschool-age children focuses on behavior-based interventions (143)." According to Angley et al. (2007), "the use of complementary and alternative medicine (CAM) is increasing in the management of children with chronic illness or disability. This is also evident in autistic disorder (AD) which has complex aetiology. A range of popular CAMs are also used in children with autistic spectrum disorder (ASD) with the intent to ameliorate the range of theorized biochemical abnormalities" (827). Until a definitive cause for autism is found, research needs to be completed concerning factors that affect these students' learning to allow them a greater chance for growth within the school, with the help of interventions and accommodations.

Current School-Based Interventions

"Early detection of – and intervention to treat- ASD is crucial because it is likely to lead to an improved outcome" (Landa, 2008). Landa (2008) also commented that "there is mounting evidence that developmental disruption is present before 3 years of age in children who are subsequently diagnosed with ASDs; and […] evidence from research on […] interventions for ASDs indicates that early intervention is likely to

optimize the outcome for children with ASDs" (139). White et al. (2007) commented that "social reciprocity deficits are a core feature of the autism spectrum disorders (ASD)" (1858). As much of school learning is based in a social context, students with autism spectrum disorders can be at a disadvantage because of their social reciprocity deficits. In order to accommodate students with autism spectrum disorders in the classrooms, schools have adopted numerous types of interventions, such as social skills training. Social skills training "involves teaching specific skills (e.g., maintaining eye contact, initiating conversation) through behavioral and social learning techniques. […] Group-based SST is an appealing intervention approach for use with children with ASD because it provides the opportunity to practice newly learned skills in a relatively naturalistic format that may promote interaction with other children" (White et al., 2007, 1859). Social skills training provides an opportunity for students with autism to learn how to interact with their peers in a school setting. Theoretically, interventions within the school, such as social skills training, allow students with autism to be closer to a level playing field with their peers. However, Shevlin found that there is limited evidence for the effectiveness of social skills interventions (2007).

Repetitive Behavior Research

Research has been completed regarding repetitive behaviors of students with PDDs. According to King et al. (2002), "given the common occurrence of restricted, repetitive and stereotyped patterns of behavior in individuals who have a pervasive developmental disorder, objective monitoring systems are imperative in the evaluation of the response to behavioral or pharmacological treatment" (109). In order to monitor those

restricted, repetitive and stereotyped patterns of behaviors, it is necessary to examine potential causes or triggers for those behaviors, especially in a school setting. A study by Fenton (1985) found that children with autism "engaged in a significantly greater frequency of stereotypes under fluorescent [lighting] as compared to incandescent lighting" (137). Much of the current research regarding behaviors of children with PDDs suggests that the restricted and repetitive behaviors are not specific to the PDDs. In a study by Zandt et al. (2007), "children with Autism Spectrum Disorders (ASD) and children with Obsessive Compulsive Disorder (OCD) were compared on a range of repetitive behaviors. […] Children with OCD reported more compulsions and obsessions than children with ASD; both groups reported more compulsions and obsessions than a typically developing comparison group" (251). Within the diagnoses of PDDs, Cuccaro et al. (2007) found that individual with Asperger's and individuals with high functioning autism "are similar with respect to the intensity or severity of repetitive behaviors and the presence of repetitive behaviors" (347). Bodfish et al. (2000) commented that "although abnormal repetition is not specific to autism, an elevated pattern of occurrence and severity appears to characterize the disorder" (237). The elevated pattern of occurrence and severity of the behaviors is an issue for student with PDDs in a school setting, and therefore must be studied further to better assist those students to succeed. Although the behaviors are not specific to the autism or to PDDs, "no study to date has compared prevalence of RRBs [(restricted, repetitive behaviors)] in very young children with TD [(typical development)] and those with ASD" (Richler et al., 2007, 74). In order to help students with ASDs, research needs to be completed in younger children as well as in a school setting comparing students with ASDs and students who are typically developing.

Through a study of the behaviors of students with autism, teachers might be able to provide better learning opportunities for students with Pervasive Developmental Disorders. This study examines a possible relationship between the different environments in a school and the occurrence of the repetitive behaviors. If there is a significant relationship between an environment and the occurrence of the behaviors, action could be taken by the school in efforts to decrease the likelihood of those behaviors, which can be disruptive to learning.

The purpose of this study is to explore the relationship between the different environments within a school and the stereotyped behaviors of students with autism. The study seeks to identify whether the behaviors of these students are similar or different in the different environments, testing the idea of environment as a stimulus for these behaviors. The study is a naturalistic observational study, and a change in prevalence of these stereotyped behaviors during the duration of the study is not a focus of this study.

Chapter 3: Methods

Participants

Participants were chosen based on prior consultation experience with the Principal Investigator. All three participants have diagnoses on the autism spectrum and receive additional support from specialists within the school. Student 1 and Student 2 both have a diagnosis of PDD-NOS. The primary challenges for Student 1 are intellectual and language challenges. Student 1 and Student 2 are both more hyperactive than Student 3 and other students in the school. Student 3 has a diagnosis of Asperger's Disorder. A

primary challenge for Student 3 is a vocal abnormality that separates him from the rest of the students.

Procedure

Recruitment

Prior to recruiting participants, five categories were chosen for the observations. The five categories chosen were peer interaction, on task, off task, verbal behaviors and motor behaviors. Incidences in the category of peer behavior were recorded when participants initiated interaction with a peer or a teacher. Peer reciprocation was not recorded or required for peer interaction. On task behavior and off task behavior were recorded based on the each student's expected tasks for each observational session. Verbal behaviors include any off-topic talking or inappropriate noises. Motor behaviors include any fidgeting and any arm/hand waving/flapping.

Student participation was obtained through parent consent only. Student consent would involve student knowledge of the study, which would have altered the data collected.

Data Collection

The study is a naturalistic observational study, consisting of four half-hour observation sessions of each student. Students were observed during the normal daily schedule, with as little interruption as possible to the schedule and environment. During each observation session, the location was recorded, as was the type of environment. The expectations of the student and activities during each observation session were recorded as well.

Once each observation session was completed, the observer completed notes from the observation session. Notes include information about the expectations of the student during the observation session, the actions of the student during the session, and any changes in routine that may have affected the session. Also after the completion of the observation sessions, the data from each category were also totaled and added to a spreadsheet for the student (see Appendix A).

Chapter 4: Results

Data collected during the observations has been organized for each student (see Appendix A) and grouped by the type of environment (see Appendix B). The observations have been highlighted different colors based on the type of environments and type of work expected in each environment. Yellow signifies an environment with a combination of independent work and group discussion. Pink signifies an environment with independent work and minimal noise. Green signifies an environment with a structured class lesson combined with quiet individual work. Finally, grey signifies an environment with limited structure and heightened noise.

Examining the data for each student, it is difficult to draw general conclusions from this data (see Appendix A). However, among the common types of environment, there are some similarities for the three students. One commonality between the three students is in the loud environments with limited structure (grey); all three of the students had numerous incidences of off task behaviors. However, in the loud environments with

limited structure, all three students also had their highest numbers of peer interactions and the lowest frequency of repetitive behaviors (verbal and motor).

As can be seen in the data, there is no clear pattern between the three students (see Appendix A). The data can be used to examine differences among each student. Student 1, who is more hyperactive and deals with intellectual/language challenges, had higher incidences of peer interaction and verbal behaviors in environments with limited structure and louder volume. Student 1 also has much higher levels of off task behavior than the other two students. Student 2 has higher levels of motor behaviors than the other two students. The motor behaviors consisted mostly of fidgeting behaviors and some arm and hand flapping.

Possible Error

There are several factors that might have contributed to errors in the data collected. Although researchers attempt to account for potential error prior to the completion of the study, some variables are beyond control and can cause errors in the data.

The purpose of using naturalistic observations is to obtain an unbiased set of data, under the pretense that the student would not be affected by the presence of the observer. However, all three of the students became aware of the observer and realized that the observer was watching them. This awareness may have led to increased levels of on task behaviors or decreased levels of off task behaviors, verbal behaviors, or motor behaviors.

Observations for Student 2 and Student 3 were completed in one day, while the observations for Student 1 were completed over several days. Not completing the observations for Student 1 in one day may affect the data for Student 1, as Student 1 may

have had a good day for one observation, but have had a bad day during another observation. Along the same line, the teacher of Student 3 informed the observer that Student 3 was having an extraordinary day on the day of the observations, which led to an increased number of peer interactions and on task behaviors. If the observations for Student 3 had been completed on a different day, or spread across several days, the data collected may not have been as ideal.

A further confound faced in the study is the absence of the regular classroom teacher and presence of a substitute teacher during observation #2 of Student 2 and Student 3. Both students had the highest number of motor behaviors during that observation session, and the highest number of incidences of off task behaviors occurred for Student 2 during that observation session. The change in the routine may have affected the data collected for that environment; however, it would be necessary to complete an additional observation of both students in that environment when the regular teacher is present in order to determine if there was an actual effect on the behaviors.

Due to time constraints, the observations were not completed in the exact same lessons. However, the observations were completed in similar types of lessons. In order to further eliminate error, the observations would need to be completed in the same types of lessons. For example, one observation would need to be completed for each student in a Physical Education class, another would need to be completed in a Math lesson, a third completed in an independent work time, and a final completed in a lunch or recess session. The environments for the three students would then be exactly the same and directly comparable, instead of being compared as similar types of environments.

Chapter 5: Conclusions

Based on the data collected in the study, general conclusions cannot be drawn about the effect of environment on the behaviors of students with autism. There are no clear patterns common to the three students to signify a direct effect between the environment and the behavior. There are some similarities within the types of environments and slight differences are observable within the data for each student. The similarities in the data show some evidence that the type of environment and the expectations within that environment might have some affect on the behaviors of students with autism. Low structure, high noise and work expectations of the student may contribute to an increase in repetitive behaviors, and are possible effectual factors for future research, although these unstructured times also promote social interactions.

In order to determine more concretely if the specific environment has a direct effect on the behaviors of students with autism, a more comprehensive study with a larger number of participants would need to be completed. Comparison with typical peers would also add to our understanding of how environment affects behaviors. Unfortunately, the variable nature of autism also does not allow for many universal statements about children with autism. Trends among these children can be identified, but more in-depth research would need to be completed.

Based on data collected in this pilot study, it might be beneficial to complete another study about the effects of structure, noise, and expectations on students with autism. The data collected in such a study might provide more concrete evidence of environmental effects on the behaviors of students with autism, which may provide a stronger basis for educational interventions for more students.

Appendix A

Name:_____ Date:_____

Observation #:_____ Start time:_____

Location:_____ End time:_____

Peer Interaction	
On task with work	**Off task with work**
Verbal behaviors (off topic discussion/responses; repetitive speech)	
Motor behaviors (hand flapping; fidgeting)	

_____
_____
_____
_____
_____
_____
_____

Appendix B

Student #1

Observations

	1	2	3	4	Total	Average
Peer Interaction	9	6	3	1	19	4.75
On task	15	8	8	13	44	11
Off task	14	11	13	6	44	11
Verbal behaviors	4	3	0	0	7	1.75
Motor behaviors	2	3	4	12	21	5.25

Student #2

Observations

	1	2	3	4	Total	Average
Peer Interaction	2	7	4	8	21	5.25
On task	11	13	10	10	44	11
Off task	3	8	4	5	20	5
Verbal behaviors	4	5	3	0	12	3
Motor behaviors	13	14	9	6	42	10.5

Student #3

Observations

	1	2	3	4	Total	Average
Peer Interaction	1	1	5	13	20	5
On task	15	14	10	18	57	14.25
Off task	0	3	2	11	16	4
Verbal behaviors	1	0	0	0	1	0.25
Motor behaviors	5	6	6	0	17	4.25

Compare:
A1 & T1 = Independent work/Group discussion
A2 & T2 & C3 = Independent/Individual work in quiet environment
A3 & T3 & C4 = Structured Class lesson with individual work
A4 & T4 & C1 & C2 = Limited structure in loud environment

Appendix C

Compare:
A1 & T1 = Independent work/Group discussion
A2 & T2 & C3 = Independent/Individual work in quiet environment
A3 & T3 & C4 = Structured Class lesson with individual work
A4 & T4 & C1 & C2 = Limited structure in loud environment

Independent work/Group Discussion

	3-1	**2-1**
Peer Interaction	1	2
On task	15	11
Off task	0	3
Verbal behaviors	1	4
Motor behaviors	5	13

Independent/Individual work in quiet environment

	3-2	**2-2**	**1-3**
Peer Interaction	1	7	3
On task	14	13	8
Off task	3	8	13
Verbal behaviors	0	5	0
Motor behaviors	6	14	4

Structured Class lesson with individual work

	3-3	**2-3**	**1-4**
Peer Interaction	5	4	1
On task	10	10	13
Off task	2	4	6
Verbal behaviors	0	3	0
Motor behaviors	6	9	12

Limited Structure in loud environment

	3-4	**2-4**	**1-1**	**1-2**
Peer Interaction	13	8	9	6
On task	18	10	15	8
Off task	11	5	14	11
Verbal behaviors	0	0	4	3
Motor behaviors	0	6	2	3

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